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PETROLOGICAL ABSTRACTS AND REVIEWS

EDITED BY ALBERT JOHANNSEN

DUPARC, LOUIS, et MONNIER, ALFRED. *Traité de technique minéralogique et pétrographique.* Vol. II-1. *Les méthodes chimiques qualitatives.* Leipzig: Veit & Co., 1913. Pp. xii+372, figs. 117, colored plate 1.

This volume, the second of the series, deals with qualitative chemical methods for the determination of minerals. A third volume on quantitative methods is to appear shortly.

The author discusses first the processes of separating the mineral constituents of a rock, or a mineral from its impurities, by means of sliming, heavy solutions, the electro-magnet, and chemicals. The microchemical reactions are next treated. It would have been desirable, from a petrographical standpoint, had the authors discussed these methods more fully than in the 27 pages here given. While much work has been done by Behrens, Streng, Brauns, Haushofer, and others in the determination of the elements, no one, since Boricky, has fully taken up the work from the mineralogist's side.

The methods for blow-pipe determinations are given from the chemical, rather than from the mineralogical side, since the determinations are for the chemical elements. To the preparation of solutions of minerals preparatory to chemical analysis, 19 pages are given. Following this there are 196 pages of chemical reactions of the different elements. This is very complete, all the methods which have ever been employed for the identification or separation of the elements being given. There are also 60 pages of spectroscopic methods and 5 of determinations of radioactivity.

The last chapter is devoted to the rapid determination of minerals by the examination of certain chemical characters. The authors here closely follow von Kobell's tables.

A good index is added, something which was greatly missed from the first part.

The book is an important and needed contribution to the chemical side of mineralogy. It is uniformly bound with the first part, in half leather.

ALBERT JOHANNSEN

Endell, K., und Rieke, R. "Ueber die Bildung des Cristobalits aus Quarzglas und ueber seine reversible Zustandsänderung bei 230," *Tschermaks Min. u. Petr. Mitt.*, XXI (1912), 501–12.

Endell, K., und Rieke, R. "Ueber die Umwandlungen des Kieselsäureanhydrids bei höheren Temperaturen," *Zeitschr. anorgan. Chemie*, LXXIX (1912), 239–59.

The authors show that quartz, amorphous silica, and quartz glass change to cristobalite at high temperatures and in the absence of mineralizers.

A. J.

Endell, K., und Smits, A. "Ueber das System SiO_2," *Zeitschr. anorgan. Chemie*, LXXX (1913), 176–84.

A further contribution to the inversion of quartz glass to β-cristobalite, quartz glass to β-quartz, and β-cristobalite to β-quartz.

A. J.

Endell, K. *Ueber die Umwandlungen der Kieselsäure bei höheren Temperaturen.* Leipzig, 1913. Pp. 6.

An address before the eighty-fourth meeting of the Gesellschaft deutscher Naturforscher und Aertzte zu Münster giving a summary of the author's work on the inversion of SiO_2 at high temperatures.

A. J.

Endell, K. "Ueber Granatamphibolite und Eklogite von Tromsö und vom Tromsdaltind," *Centralbl. f. Min., etc.*, 1913, 129–33.

Garnet amphibolite and eclogite from northern Norway are described. A chemical analysis of the former, calculated in the Osann system, gives $a_{1,5}c_5f_{13\cdot5}$.

A. J.

Fenner, Clarence N. "The Various Forms of Silica and Their Mutual Relations," *Jour. Washington Acad. Sci.*, II (1912), 471–80.

Shows that either tridymite or cristobalite may, under certain conditions, such as those which induce rapid crystallization, form at temperatures below their inversion points. Either mineral will retain its form when the temperature is reduced. Quartz, however, is probably never deposited at temperatures greater than 870°. The inversion point of quartz to tridymite is 870°+10°, and tridymite to cristobalite 1470°+10°. The α–β inversion point of quartz at 575° is not questioned.

A. J.

FLETT, J. S., and HILL, J. B. *The Geology of the Lizard and Meneage*, Mem. Geol. Survey England and Wales, Explanation of Sheet 359. London, 1912. Pp. 280, pl. 15, figs. 10.

The rocks described are serpentines, peridotites, gabbros, dolerites, epidiorites, gneisses, granite gneisses, greenstones, soda granite porphyries, granites, and schists, as well as sedimentary rocks. Many analyses are given, and there are 24 fine heliotypes of rock sections.

A. J.

FOOTE, W. M. "Preliminary Note on the Shower of Meteoric Stones at Aztec, near Holbrook, Navajo County, Arizona," *Amer. Jour. Sci.*, XXXIV (1912), 437–56, figs. 17.

In the meteoric fall at Holbrook, Ariz., July 19, 1912, over 14,000 stones are recorded, with a total weight of 218,310 grams.

A. J.

GALPIN, SYDNEY LONGMAN. "Studies of Flint Clays and Their Associates," *Trans. Amer. Ceramic Soc.*, XIV (1912), 301–46.

From geologic occurrences, dehydration tests, and microscopic examination, the author concludes: (1) Flint clays have been formed by the setting and recrystallization of fine-grained, largely colloidal sediments. The products of recrystallization are mainly kaolinite, with minor amounts of hydrated micas. (2) The semi-flint or soft clays have been derived from the flint clays through metamorphism, resulting in a conversion of much kaolinite into hydro-micas. (3) Plastic fire clays have resulted from long weathering of the soft clays. They contain a high percentage of hydro-mica. (4) The change from muscovite through hydrated or hydro-micas to kaolinite may take place without destruction of the original structure, indicating the possibility of an isomorphous series embracing all of these minerals.

A. J.

GOLDBECK, ALBERT T., and **JACKSON**, FRANK H. *The Physical Testing of Rock for Road Building.* Bull. 44, Office of Public Roads, U.S. Dept. of Agriculture, Washington, 1912. Pp. 96, figs. 20.

GRATON, L. C., and MURDOCH, JOSEPH. "The Sulphide Ores of Copper. Some Results of Microscopic Study," *Trans. Amer. Inst. Min. Eng.*, New York meeting, Feb., 1913, 741–809.

While this paper is principally of interest to the economic geologist, it is of importance to the petrographer from the authors' work on the determination of ore minerals by means of the microscope. This is a problem which has only recently been attacked, and in the solution of which but little has been done. It opens up a new field to petrographers, and promises to be of great importance in the determination of opaque minerals.

A. J.

GWILLIM, FARIBAULT, and BARLOW. *Report on the Geology and Mineral Resources of the Chibougamau Region, Quebec.* Quebec, 1911. Pp. 216+viii, pl. 78, figs. 19, maps 2.

Numerous rocks and minerals are described and illustrated. A number of analyses is given.

HARDER, E. C. "Structure and Origin of the Magnetite Deposits near Dillsburg, York County, Pennsylvania," *Econ. Geol.*, V (1910), 599–622.

HATCH, F. H., and RASTALL, R. H. *Text Book of Petrology; The Sedimentary Rocks.* London, George Allen & Co. Pp. 525, figs. 60.

While there is a wealth of literature regarding the sedimentary rocks, the processes which produce them, and their metamorphic equivalents, this volume represents the first published attempt, in English, to bring the knowledge of the subject together. About one-third of the book is devoted to the sedimentary rocks, and the balance to the metamorphic processes and the metamorphic derivatives of the sediments. The subjects cementation, metasomatism, contact metamorphism, regional metamorphism, and weathering are included.

Though no classification of the sediments has been generally agreed upon, the authors group deposits as fragmental, chemical, and organic. The various types of these are described, and much space is devoted to their origin. An attempt is made to present criteria by means of which the terrestrial deposits may be distinguished from each other and from marine deposits. These criteria include the form and size of the grains, and the presence or absence of certain minerals, but, as is pointed out by the authors, there are such insufficient data on many of these points and the exceptions are so numerous that safe conclusions can scarcely be drawn. The absence of mica in wind-blown sand is notable, but this criterion could not confidently be applied to cemented deposits where mica might have been developed by slight metamorphism.

The statement is made that because of variations in the chemical composition of coals "they must have originated under widely different conditions." This is hardly a necessary conclusion, since varying amounts of inorganic matter must have been transported by wind and water into the many basins of accumulation. The analyses of different kinds of coals quoted are neither average nor typical analyses of their types.

The authors seem to accept the idea that the fusion of sediments on a large scale is due to the great pressure of accumulated overlying matter, but it is to be greatly doubted whether fusion on a large scale has ever taken place, although there are undoubtedly many places where local fusion has gone on. The thickness given for the Laurentian gneisses as some 50,000 feet may be the result of complex duplication of beds by faulting and folding.

The geology of the Scottish Highlands, which has been so minutely worked out in recent years, is presented in some detail as an illustration of regional metamorphism.

A final chapter on the systematic examination of the loose detrital sediments is given under the authorship of T. Crook.

Field data and abundant references to geological literature enhance the value of the book and it is well adapted to elementary courses. The figures are numerous and clear.

E. A. STEPHENSON

IDDINGS, JOSEPH P. "The Petrography of Some Igneous Rocks of the Philippines," *Philippine Jour. Sci.*, V (1910), 155–70.

Describes both plutonic and eruptive rocks. Andesites make up the great bulk of the volcanic rocks of the island, basalts are next in importance, while dacites and rhyolites, so far as known, are rare and occur in relatively small bodies. Syenite, diorite, quartz diorite, gabbro, peridotite, and granite occur, the latter being rather uncommon. The rocks are given the standard names, no attempt having been made to determine them in the Cross, Iddings, Pirsson, Washington system.

A. J.

JEVONS, H. STANLEY, JENSEN, H. I., TAYLOR, T. G., and SÜSSMILCH, C. A. "The Geology and Petrography of the Prospect Intrusion," *Jour. and Proc. Roy. Soc. N.S. Wales*, XLV (1911), 445-553.

About 18 miles from Sydney, in the midst of the Wianamatta (Triassic) shales, occurs a massive intrusion of an augite-plagioclase rock. The mass is roughly oval in shape, two miles long by one mile wide, and forms a ring inclosing an isolated area of the shale. Numerous exposures show this shale to be nowhere more than a few feet thick, and the igneous rock is everywhere continuous beneath it. The main rock consists of titaniferous augite 36 per cent, a zonal feldspar 36 per cent, olivine 10 per cent, ilmenite and magnetite 13 per cent, with biotite and apatite as accessories, and analcite secondary. The plagioclase is called an acid labradorite by the authors. Its central portion is labradorite (Ab_3An_4), the rim is oligoclase ($Ab_6 An_1$), and the average composition of the whole, by analysis, Ab_4An_3. The authors believe the analcite to have been derived from the feldspar, and not from a pre-existing nephelite. They regard it as distinctly secondary.

Surrounding the central mass of the intrusion is a shell of a very dark, compact, gray rock, having the appearance of basalt. It not only forms the outer zone, but occurs at the contact with the central mass of shale as well, showing that it is actually a mantle around the entire mass. This rock grades into that of the main mass, the size of grain gradually increasing.

The main mass of the Prospect rock has always been called a dolerite in the sense of Teall, Hatch, *et al.*, and not in the German sense, or a diabase in the sense of Harker. The outer zone has been spoken of as basalt or olivine basalt. On account of the association of the rock with nephelite rocks, and the presence of as much as 18 per cent of orthoclase and a little aegirite-augite in some of the segregation veins, the authors regard the rock as a basic differentiation product of an alkali mother magma, wherefore they give to it the name essexite. To the border they give the name pallio-essexite, the prefex being applied by Mr. Jevons to denote the compact envelope of any rapidly cooled igneous rock. In the Cross, Iddings, Pirsson, Washington system, the rocks are camptonoses; the inner mass a grano-augite-camptonose, the envelope a pitaxi-biaugi-camptonose.

Further, there are described associated pegmatite and aplite veins, and the mode of intrusion is discussed.

ALBERT JOHANNSEN

JEVONS, H. STANLEY, JENSEN, H. I., and SÜSSMILCH, C. A. "The Differentiation Phenomena of the Prospect Intrusion," *Jour. and Proc. Roy. Soc. N.S. Wales*, XLVI (1912), 111–38.

In this paper the origin of the various segregation veins occurring in the Prospect intrusion is discussed. The authors assume that all have originated *in situ* during the cooling and consolidation of a single magma, which may or may not have been homogeneous when intruded. The paper is divided into two parts. In the first Jevons summarizes the various differentiation hypotheses, and in the second, the differentiation phenomena of the Prospect intrusion are discussed by Jensen and Süssmilch.

A. J.

JOHANNSEN, ALBERT. *Manual of Petrographic Methods.* New York: McGraw-Hill Book Co., 1914. Pp. xxviii+649, figs. 770.

This publication fills a long-felt want of a comprehensive book in English on petrographic methods.

After a brief introduction on crystallographic principles and on stereographic projection it gives a full treatment of those parts of optical crystallography of value in petrographic research, and the various means of determining the optical constants. For each of the more important properties, methods are given in historic order. Not only are the present standard methods fully described, but those of historic interest are either described or briefly outlined, with references to the original literature, so that one hoping to improve petrographic technique may be saved much unnecessary labor by having placed before him the various schemes that have been tried and later displaced by apparently more satisfactory methods. The discussions are both geometrical and analytical.

The properties of lenses are discussed and the various types of microscopes and accessories are briefly described and illustrated, thus giving the student an idea of the different characteristics of the designs of instruments produced by the various European and American makers.

Methods of specific gravity determinations and of separation of rock constituents are given, including a description of each of the various heavy solutions and melts used for such purposes. Microchemical tests are briefly presented, the treatment being limited to special methods for distinguishing certain particular minerals and groups.

Methods for the study of opaque minerals are but briefly referred to. Considering the growing importance of this part of the subject, it would seem desirable that this section should be expanded, as the author himself remarked in his preface.

The book ends with a discussion of the preparation of thin sections, collecting, filing, and cataloguing of rock specimens and sections, and an appendix of useful mathematical formulas, recipes, etc.

A special feature of the book is the references to the original literature, which are representative and comprehensive even in those parts of the subject which are but briefly treated in the text.

The illustrations are abundant and excellent. Special mention may be made of the beautiful half-tones (after Hauswaldt) of interference figures. And in this connection it may be noted that much credit is due the publishers for the excellent book work—a feature which adds much to the readability and usefulness of the book.

The multiplicity of methods described would probably be confusing to most beginning students, yet the descriptions are presented as far as possible in a simple and elementary way, taking little for granted, and thus by a judicious selection of the articles to be studied, the book could be made use of in an elementary course. Numerous cross-references are helpful in making rapid reference possible to related or explanatory sections.

For a first edition of a book of this character, dealing with numerous details of description, tables, and formulas, it appears to be remarkably free from infelicities or errors of detail in statement or print. With no attempt at completeness, a few may be noted.

P. 20, throughout discussion, a should read c to agree with Fig. 35.

P. 33, article 25, line 10, "If α is constant," read ω for α.

P. 67, the row of figures 113 to 118 should be inverted, the figure at the right being 113.

It would seem desirable to use some such expression as "normal velocity surface" instead of "wave surface" in the discussions of pp. 75 ff., and also pp. 97 and 98. Light passing from the center point may be ideally conceived as actually passing out in the form of the so-called ray surface, but it cannot be imagined as spreading out in the form of the "wave surface," and this again is confusing to students. The vibration "ellipsoid" of Fig. 131 should of course be "ovaloid."

P. 243, line 1, second paragraph, for "microscope" read "micrometer."

P. 275, next to last line, for figure "370" read "373."

P. 358, α and α' should read θ and θ' (lines 3 and 11).

P. 359, line 2, sin ${}^2V > K$ should read sin ${}^2V < K$.

P. 528, in table, fifth column, bottom row "bromoform" should read "iodoform."

It is remarkable, considering recent tendencies, to find so large a general treatise in petrography without an abundance of newly coined terms. The author contents himself with one: melatope, for the spot or "eye" in interference figures representing the emergence of an optic axis.

GEORGE D. LOUDERBACK

JOHNSTON, JOHN, and ADAMS L. H. "On the Density of Solid Substances with Especial Reference to Permanent Changes Produced by High Pressures," *Jour. Amer. Chem. Soc.*, XXXIV (1912), 563–84.

JOHNSTON, JOHN, and ADAMS, L. H. "On the Effect of High Pressures on the Physical and Chemical Behavior of Solids," *Amer. Jour. Sci.*, XXV (1913), 205–53.

KATO, TAKEO. "Ueber die Kordieritführenden Einschlüsse in der Lava aus dem Vulkan Komagataké auf Hokkaido, Japan," *Jour. Geol. Soc. Tokyo*, XIX (1912), 27–37.

The volcano of Komagataké is built up of layers of pyroxene andesite and pumice agglomerate. The chief lava streams are three in number, of which the lower is compact, the second less so, and the upper porous and slaggy and filled with inclusions of the same material and fragments of rhyolite, norite, and cordierite-bearing rock. The three lava streams have similar mineral composition and consist of labradorite, hypersthene, and augite, in a glassy or hyalopilitic groundmass. Olivine occurs in the lower part of the middle flow. The underlying rock of Komagataké consists of late Tertiary tuffites, shales, and diatomaceous earths, and the cordierite in the included fragments has been produced by the metamorphism of the sedimentary rock by the andesite.

A. J.

KATO, TAKEO. "The Tourmaline Copper Veins in the Yakuoji Mine, Nagato Province, Japan," *Jour. Geol. Soc. Tokyo*, XIX (1912), 69–88.

The copper veins of the Yakuoji mine occur at the contact between a monzonite stock and Paleozoic sediments, 3 kilometers east of Oda in the province Nagato. Near the contact with the eruptive rock the metamorphosed sandstones and sandy slates are traversed by innumerable minute veinlets consisting chiefly of chlorite and rare tourmaline. The latter mineral occurs in irregular patches and is considered by the author as replacing feldspar grains, partially or entirely.

A. J.

KILLIG, FRANZ. *Das Korund- und Paragonitvorkommen am Ochsenkopf bei Schwarzenberg in Sachsen.* Inaug. Diss., Greifswald, 1912.

The corundum of the Ochsenkopf is a product of regional metamorphism and was derived, contemporaneously with the formation of the surrounding phyllite, from an aluminium rich sediment. The paragonite is not an alteration product of the corundum but has been derived independently from the normal phyllite.

A. J.

KOLDERUP, CARL FRED. "Sogneskollens og Bremangerlandets granodioriter," *Bergens Museums Aarbok*, 1911, Nr. 18, pp. 30.

Describes various granodiorites. The rock from Sogneskollen, in western Norway, is post-Silurian in age. It consists of about 70 per cent feldspar, predominantly oligoclase, with some microperthite, microcline, and orthoclase; 23½ per cent quartz, 6 per cent biotite, and some epidote, garnet, titanite, pyrite, and sericite. The granodiorite of the Island of Svano occurs in the form of a dike. It contains 55⅔ per cent plagioclase (oligoclase-albite and albite), 12 per cent orthoclase and microcline, 23 per cent quartz, 9 per cent muscovite and epidote, and one-third of 1 per cent zircon, apatite, and titanite. The Bremangerland rock consists of 62 per cent feldspar which is entirely andesine, oligoclase, and albite. No orthoclase occurs although a little K_2O is shown by the analysis. Quartz makes up 27¾ per cent of the rock, biotite 9 per cent, magnetite two-thirds of 1 per cent, and pyrite one-third of 1 per cent. This rock cuts the Silurian strata and occurs in fragments in the Devonian. Analyses are given of all of the rocks.

A. J.

Kolderup, Carl Fred, og Ottesen, P. O. "Utsires fjeldbygning og bergarter," *Bergens Museums Aarbok*, 1911, Nr. 17, pp. 21.

Utsire is a small island off the west coast of Norway. About four-fifths of the rock of which it is composed is gabbro, and one-fifth is "granodiorite." A small amount of gneiss was found. An analysis of the "granodiorite" shows but 0.25 per cent of K_2O, and on the mechanical separation of the constituents by means of heavy solutions, no orthoclase was found, the constituents being 50 per cent plagioclase (labradorite 7 per cent and oligoclase 43 per cent), 42 per cent quartz, 8 per cent hornblende, and accessory biotite, iron minerals, and garnet. The rock would better be called a quartz rich quartz diorite.

A. J.

Koto, B. "On nephelite-basalt from Yingé-men, Manchuria," *Jour. Coll. Sci., Imp. Univ. Tokyo*, XXXII (1912), Art. 6, pp. 14, pl. 2.

This is the first recorded occurrence of nephelite basalt in the Japanese-Korean-Chinese region. It is found in the Yingé-men area, forming low hills, and was probably poured out from the junction between the granite country rock and the overlying Cambrian formation. Its age was not determined. The rock is megascopically porphyritic with minute olivine phenocrysts. Under the microscope its texture is nearly holocrystalline, a very small amount of a brownish, granulated, or fibrous base occurring. The minerals, in the order of their abundance, are: titanaugite, magnetite and titaniferous magnetite, nephelite (30 per cent), and olivine (15 per cent). Picotite is an accessory. Neither feldspar nor apatite occurs. According to the quantitative system of Cross, Iddings, Pirsson, and Washington the rock is a shonkinose-monchiquose, the norm giving 45.5 per cent feldspar, 11.9 per cent nephelite, 23 per cent diopside, 1.4 per cent olivine, 7.4 per cent magnetite, 5.5 per cent ilmenite, and 1.0 per cent apatite.

A. J.

Kraus, Edward H. "Die Aenderungen des optischen Axenwinkels im Glauberit mit der Temperatur,"[1] *Zeitschr. f. Kryst.*, LII (1913), 321–26.

So long ago as 1829 Brewster showed that the optic axial angle of glauberite was changed with change of temperature. Kraus shows that the mineral is uniaxial for sodium light at 42°.9 and for lithium light at 51°.8. The curves show that, like gypsum, with increasing temperature the angle becomes less and less until the zero value is reached, after which increasing temperature enlarges it.

A. J.